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2004 MAZDA 6/Atenza Sedan OEM Service and Repair Workshop Manual

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NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)]

SM2897155

id0103s380140

8	ENGINE RUNS ROUGH/ROLLING IDLE
DESCRIPTION	• Idle speed lower than the specification. • Idling speed unstable, increases/decreases.

Item (definition)	Unit/Condition	Definition	Condition/Specification (Reference)
ECT2_V	V	ECT sensor No.2 voltage	• ECT is 20 °C {68 °F}: Approx. 3.10 V • ECT is 40 °C {104 °F}: Approx. 2.16 V • ECT is 60 °C {140 °F}: Approx. 1.40 V • ECT is 80 °C {176 °F}: Approx. 0.87 V • ECT is 100 °C {212 °F}: Approx. 0.54 V
FUEL_PRES	KPa {MPA}, mBar {BAR}, psi, in H20	Fuel pressure	• Displays fuel pressure
	V		Idle (ECT 80 °C {176 °F}) • Fuel pressure is 10 MPa {102 kgf/cm ^{2}, 1450 psi}: Approx. 1.4 V
LOAD	%	Engine load	• Idle (after warm up): Approx. 16.07 % • Racing (engine speed is 2,000 rpm): Approx. 13.33 % • Racing (engine speed is 4,000 rpm): Approx. 15.29 %
LONGFT1	%	Long term fuel trim	• Idle (after warm up): Approx. -3.9 % • Racing (engine speed is 2,000 rpm): Approx. -0.78 % • Racing (engine speed is 4,000 rpm): Approx. -0.78 %
MAF	g/Sec	Mass air flow	• Displays MAF
	V		• Ignition switched ON (engine off) (MAF: 0.00 g/s {0 lb/min}): Approx. 1.69 V (ECT is 53 °C {127 °F}) • Idle (after warm up) (MAF: 2.50 g/s {0.331 lb/min}): Approx. 1.89 V (ECT is 93 °C {199 °F}) • Racing (engine speed is 2,000 rpm) (MAF: 3.80 g/s {0.503 lb/min}): Approx. 2.02 V (ECT is 95 °C {203 °F})
MAP	KPa {MPA}, mBar {BAR}, psi, in H20	Manifold absolute pressure	• Displays MAP
MAP_V	V	MAP sensor voltage	• Ignition switched ON (engine off) (MAP:100 kPa {1.02 kgf/cm ^{2}, 14.5 psi}): Approx. 4.04 V • Idle (after warm up) (MAP: 35 kPa {0.36 kgf/cm ^{2}, 5.1 psi}): Approx. 1.40 V • Racing (engine speed is 2,000 rpm) (MAP: 26 kPa {0.27 kgf/cm ^{2}, 3.8 psi}): Approx. 1.01 V
O2S11	µA	A/F sensor	• Idle (after warm up): Approx. -39 µA • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 3.84 mA
O2S12	V	HO2S	• Idle (after warm up): 0−1.0 V • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 0 V
RPM	RPM	Engine speed	• Displays engine speed
SHRTFT1	%	Short term fuel trim	• Idle (after warm up): Approx. 2.34 % • Racing (engine speed is 2,000 rpm): Approx. 3.9 % • Racing (engine speed is 4,000 rpm): Approx. 1.56 %
TP_REL	%	Throttle position signal (relative value)	• Accelerator pedal released: Approx. 12 % • Accelerator pedal depressed: Approx. 82 %
VSS	KPH, MPH	Vehicle speed	• Displays vehicle speed

Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
1	VERIFY IF MALFUNCTION INCLUDES HARD ENGINE STARTING • Verify the vehicle engine condition. • Can idling be maintained?	Yes	Go to the next step.
		No	Perform the symptom troubleshooting "NO.5 ENGINE STALLS-AFTER START/AT IDLE". (See NO.5 ENGINE STALLS-AFTER START/AT IDLE [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)

STEP	INSPECTION	RESULTS	ACTION
6	**INSPECT DRIVE-BY-WIRE CONTROL SYSTEM OPERATION** • Perform the Electronic Control Throttle Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Does the drive-by-wire control system work properly?	Yes	Visually inspect the throttle body (damage/scratching). • If there is any malfunction: — Repair or replace the malfunctioning part according to the inspection results. • If there is no malfunction: — Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
7	**INSPECT FUEL INJECTOR OPERATION** • Perform the Fuel Injector Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Do the fuel injectors operate properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
8	**INSPECT PURGE CONTROL SYSTEM OPERATION** • Perform the Purge Control System Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Does the purge solenoid valve work properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
9	**INSPECT RELATED PART CONDITION** • Inspect the following: — Fuel quality (proper octane, contamination, winter/summer blend) — Intake-air system restriction or leakage — Electrical connectors connection — Fuel leakage in fuel system — Vacuum leakage — Engine oil viscosity — CKP sensor, intake CMP sensor and exhaust CMP sensor • Installation condition (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) (See CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Damaged trigger wheel, intake camshaft and exhaust camshaft • Is there any malfunction?	Yes	Service if necessary. • Repeat this step.
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
17	**INSPECT ELECTRIC VARIABLE VALVE TIMING MOTOR** • Inspect the electric variable valve timing motor. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the electric variable valve timing motor/driver. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
18	**INSPECT ELECTRIC VARIABLE VALVE TIMING ACTUATOR** • Inspect the electric variable valve timing actuator. (See ELECTRIC VARIABLE VALVE TIMING ACTUATOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the electric variable valve timing actuator. (See ELECTRIC VARIABLE VALVE TIMING ACTUATOR, HYDRAULIC VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
19	**INSPECT HYDRAULIC VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION** • Perform the Hydraulic Variable Valve Timing Control System Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
20	**INSPECT FOR MALFUNCTION DUE TO DEVIATED VALVE TIMING** • Inspect the valve timing (timing chain installation condition). (See TIMING CHAIN REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is the valve timing normal?	Yes	Inspect for the following engine internal parts: • Cylinder • Piston ring • Intake valve • Exhaust valve • Such as cylinder head gasket — If there is any malfunction: • Repair or replace the malfunctioning part according to the inspection results.
		No	Adjust the valve timing to the correct timing.
21	**INSPECT IGNITION SYSTEM OPERATION** • Perform the Spark Test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is a strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
22	**INSPECT EXHAUST SYSTEM FOR RESTRICTION** • Inspect for restriction in the exhaust system and the TWC. • Is there any restriction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
23	**INSPECT IF MALFUNCTION CAUSE IS PCV VALVE OR INJECTOR DRIVER (PCM INTEGRATED)** • Inspect the PCV valve. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the PCV valve. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Injector driver malfunction. • Replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) If the problem remains, overhaul the engine.

Item (definition)	Unit/Condition	Definition	Condition/Specification (Reference)
AC_REQ	Off/On	A/C request signal	• A/C switch off: Off • A/C switch on: On
APP1	%	APP sensor No.1	• Accelerator pedal released: Approx. 15% • Accelerator pedal depressed: Approx. 90.58%
	V		• Accelerator pedal released: Approx. 0.75 V • Accelerator pedal depressed: Approx. 4.52 V
APP2	%	APP sensor No.2	• Accelerator pedal released: Approx. 7.45% • Accelerator pedal depressed: Approx. 45.49%
	V		• Accelerator pedal released: Approx. 0.38 V • Accelerator pedal depressed: Approx. 2.26 V
ECT	°C, °F	Engine coolant temperature	• Displays ECT
	V		• ECT is 20 °C {68 °F}: Approx. 3.10 V • ECT is 40 °C {104 °F}: Approx. 2.16 V • ECT is 60 °C {140 °F}: Approx. 1.40 V • ECT is 80 °C {176 °F}: Approx. 0.87 V • ECT is 100 °C {212 °F}: Approx. 0.54 V
FUEL_PRES	KPa {MPA}, mBar {BAR}, psi, in H20	Fuel pressure input from fuel pressure sensor	• Displays fuel pressure
	V	Fuel pressure sensor voltage	• Idle (ECT 80 °C {176 °F}) — Fuel pressure is 10 MPa {102 kgf/cm ^{2}, 1450 psi}: Approx. 1.4 V
LOAD	%	Engine load	• Idle (after warm up): Approx. 16.07% • Racing (engine speed is 2,000 rpm): Approx. 13.33% • Racing (engine speed is 4,000 rpm): Approx. 15.29%
LONGFT1	%	Long term fuel trim	• Idle (after warm up): Approx. -3.9% • Racing (engine speed is 2,000 rpm): Approx. -0.78% • Racing (engine speed is 4,000 rpm): Approx. -0.78%
O2S11	µA	A/F sensor	• Idle (after warm up): Approx. -39 µA • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 3.84 mA
O2S12	V	HO2S	• Idle (after warm up): 0−1.0 V • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 0 V
RPM	RPM	Engine speed	• Displays engine speed
SHRTFT1	%	Short term fuel trim	• Idle (after warm up): Approx. 2.34% • Racing (engine speed is 2,000 rpm): Approx. 3.9% • Racing (engine speed is 4,000 rpm): Approx. 1.56%
TP_REL	%	Throttle position signal (relative value)	• Accelerator pedal released: Approx. 12% • Accelerator pedal depressed: Approx. 82%
VSS	KPH, MPH	Vehicle speed	• Displays vehicle speed

Diagnostic Procedure

NO.10 LOW IDLE/STALLS DURING DECELERATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)]

SM2897157

id0103s380160

10	LOW IDLE/STALLS DURING DECELERATION
DESCRIPTION	• Engine speed decreases when the accelerator pedal is released. • Stalls during deceleration with the accelerator pedal fully released. • When the accelerator pedal is fully released, vehicle stalls directly after vehicle stops.

Item (definition)	Unit/Condition	Definition	Condition/Specification (Reference)
ECT	°C, °F	Engine coolant temperature	• Displays ECT
	V		• ECT is 20 °C {68 °F}: Approx. 3.10 V • ECT is 40 °C {104 °F}: Approx. 2.16 V • ECT is 60 °C {140 °F}: Approx. 1.40 V • ECT is 80 °C {176 °F}: Approx. 0.87 V • ECT is 100 °C {212 °F}: Approx. 0.54 V
ECT2_V	V	ECT sensor No.2 voltage	• ECT is 20 °C {68 °F}: Approx. 3.10 V • ECT is 40 °C {104 °F}: Approx. 2.16 V • ECT is 60 °C {140 °F}: Approx. 1.40 V • ECT is 80 °C {176 °F}: Approx. 0.87 V • ECT is 100 °C {212 °F}: Approx. 0.54 V
FUEL_PRES	KPa {MPA}, mBar {BAR}, psi, in H20	Fuel pressure	• Displays fuel pressure
	V		Idle (ECT 80 °C {176 °F}) • Fuel pressure is 10 MPa {102 kgf/cm ^{2}, 1450 psi}: Approx. 1.4 V
LOAD	%	Engine load	• Idle (after warm up): Approx. 16.07 % • Racing (engine speed is 2,000 rpm): Approx. 13.33 % • Racing (engine speed is 4,000 rpm): Approx. 15.29 %
LONGFT1	%	Long term fuel trim	• Idle (after warm up): Approx. -3.9 % • Racing (engine speed is 2,000 rpm): Approx. -0.78 % • Racing (engine speed is 4,000 rpm): Approx. -0.78 %
MAF	g/Sec	Mass air flow	• Displays MAF
	V		• Ignition switched ON (engine off) (MAF: 0.00 g/s {0 lb/min}): Approx. 1.69 V (ECT is 53 °C {127 °F}) • Idle (after warm up) (MAF: 2.50 g/s {0.331 lb/min}): Approx. 1.89 V (ECT is 93 °C {199 °F}) • Racing (engine speed is 2,000 rpm) (MAF: 3.80 g/s {0.503 lb/min}): Approx. 2.02 V (ECT is 95 °C {203 °F})
MAP	KPa {MPA}, mBar {BAR}, psi, in H20	Manifold absolute pressure	• Displays MAP
MAP_V	V	MAP sensor voltage	• Ignition switched ON (engine off) (MAP:100 kPa {1.02 kgf/cm ^{2}, 14.5 psi}): Approx. 4.04 V • Idle (after warm up) (MAP: 35 kPa {0.36 kgf/cm ^{2}, 5.1 psi}): Approx. 1.40 V • Racing (engine speed is 2,000 rpm) (MAP: 26 kPa {0.27 kgf/cm ^{2}, 3.8 psi}): Approx. 1.01 V
O2S11	µA	A/F sensor	• Idle (after warm up): Approx. -39 µA • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 3.84 mA
O2S12	V	HO2S	• Idle (after warm up): 0−1.0 V • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 0 V
RPM	RPM	Engine speed	• Displays engine speed
SHRTFT1	%	Short term fuel trim	• Idle (after warm up): Approx. 2.34 % • Racing (engine speed is 2,000 rpm): Approx. 3.9 % • Racing (engine speed is 4,000 rpm): Approx. 1.56 %
TP_REL	%	Throttle position signal (relative value)	• Accelerator pedal released: Approx. 12 % • Accelerator pedal depressed: Approx. 82 %
VSS	KPH, MPH	Vehicle speed	• Displays vehicle speed

Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
5	**DETERMINE IF MALFUNCTION CAUSE IS A/C REQUEST SIGNAL OR OTHER** • Access the AC_REQ PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Monitor the AC_REQ PID while turning on and off the air conditioner using the switch on the control panel. • Does the AC_REQ PID value change from on to off according to switch control panel?	Yes	Go to the next step.
		No	If the AC_REQ PID is always ON: • Perform the symptom troubleshooting "A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY". (See A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [FULL-AUTO AIR CONDITIONER].) (See A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [MANUAL AIR CONDITIONER].) If the AC_REQ PID is always OFF: • Perform the symptom troubleshooting "A/C DOES NOT WORK SUFFICIENTLY". (See A/C DOES NOT WORK SUFFICIENTLY [FULL-AUTO AIR CONDITIONER].) (See A/C DOES NOT WORK SUFFICIENTLY [MANUAL AIR CONDITIONER].)
6	**DETERMINE IF MALFUNCTION CAUSE IS DRIVE-BY-WIRE CONTROL SYSTEM OR OTHER** • Will the engine run smoothly at part throttle?	Yes	Go to Step 8.
		No	Go to the next step.
7	**INSPECT DRIVE-BY-WIRE CONTROL SYSTEM OPERATION** • Perform the Electronic Control Throttle Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Does the drive-by-wire control system work properly?	Yes	Visually inspect the throttle body (damage/scratching). • If there is any malfunction: — Repair or replace the malfunctioning part according to the inspection results. • If there is no malfunction: — Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
8	**INSPECT FUEL INJECTOR OPERATION** • Perform the Fuel Injector Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Do the fuel injectors operate properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
9	**INSPECT PURGE CONTROL SYSTEM OPERATION** • Perform the Purge Control System Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Does the purge solenoid valve work properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.

STEP	INSPECTION	RESULTS	ACTION
14	**INSPECT SPILL VALVE CONTROL SOLENOID VALVE CONTROL CIRCUIT FOR SHORT TO GROUND** • Switch the ignition off. • Disconnect the high pressure fuel pump and PCM connectors. • Inspect for continuity between high pressure fuel pump terminal A (wiring harness-side) and body ground. • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between high pressure fuel pump terminal A and PCM terminal 1DI. **If there is a common connector:** • Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for a short to ground. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has a short to ground. If the malfunction remains: • Replace the PCM. (damage to driver in PCM) (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Replace the high pressure fuel pump. (See HIGH PRESSURE FUEL PUMP REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
15	**INSPECT FUEL PRESSURE (LOW-SIDE)** • Connect the fuel pressure gauge between fuel pump and high pressure fuel pump. • Measure the low side fuel pressure. (See FUEL LINE PRESSURE INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is the low side fuel pressure within specification? **Specification:** • 405–485 kPa {4.13–4.94 kgf/cm^2, 58.8–70.3 psi}	Yes	Go to the next step.
		No	Inspect the following: • Fuel line restriction • Fuel filter clogged — If there is any malfunction: • Repair or replace the malfunctioning part according to the inspection results. — If there is no malfunction: • Replace the fuel pump unit. (See FUEL PUMP UNIT REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
16	**VERIFY ATX DTC** • Retrieve TCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST MODE [TCM (FW6A-EL, FW6AX-EL)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See ON-BOARD DIAGNOSTIC SYSTEM DTC TABLE [TCM (FW6A-EL, FW6AX-EL)].)
		No	Go to the next step.
17	**INSPECT ENGINE COMPRESSION** • Measure the compression pressure for each cylinder. (See COMPRESSION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Are compression pressures within specification?	Yes	Go to Step 23.
		No	Go to the next step.
18	**INSPECT ELECTRIC VARIABLE VALVE TIMING DRIVER** • Inspect the electric variable valve timing driver. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the electric variable valve timing motor/driver. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.